

UNIVERSITY OF NOTTINGHAM

*The analysis of batch processing industry **characteristics**
and
the evaluation of **MRP-II** suitability in this **context***

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Declaration of Originality

Title of Dissertation

***The Analysis of batch processing industry characteristics
and
the evaluation of MRP-II suitability in this context***

This dissertation has been written by me. Material **from** any outside source which I have used directly or indirectly is acknowledged accurately and I have made clear the extent to which it has been used

Name : **Kang Eng Thye**

Signed :

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

Dated : **24 September 1996**

Abstract

This project is initiated due to the major problems of **MRP II** installation fail in the world wide. Almost **80%** failure are reported. However, these problems seem can not be solved easily.

Besides that, my previous working experience in computer consulting firm and a multi-national food manufacturing company in where my responsibility is to assist them selecting a process MRP-II has given me a great deal of valuable personal experience and comment on the in the computer company **software** as well as the weaknesses of the user company operations.

From the analysis result, the major cause is mainly the lack of understanding business environment in detail. Therefore, the aim of this dissertation is to explore the characteristics of different major batch industries and then evaluation is carried out on the MRP II suitability in this context.

Finally, practical and real industries discussion are the main focus of this project for the need of the industries manager who intend to seek the MRP II **software** as well as the importance source for the vendors who need to understand the characteristics of each different batch industries.

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Chapter I

***General description of various industries classification
and detail analysis on batch processing industries
characteristics***

Chapter 1

*General description of various industries **classification** and detail analysis on batch processing industries characteristics*

1.1 Introduction

Competitive pressures and changing industry dynamics have forced a number of new strategic imperatives on manufacturers. High competition especially in the world market has forced the top **management** in most organization to consider more advance technology in order to keep **in** pace with the world business trend and competition.

For instance, **Manufacturing Resource Planning (MRP II)** has been widely used by most organizations as an important tool to enhance their management and increase productivity which cover all main business functions.

However, understanding the **full** operation of an organization is not an easy task. Furthermore, it is much complex (so many types of industries) and a lot of internal and external factors which are always influence the success or failure of an organization. This is the major drawback for implementing a good MRP II system and thus a lot of organizations encounter a lot of failure implementing such a complex computerized system

Therefore, the main purpose of this project is to analyze in depth the characteristics of each batch industry in order to justify their suitability before purchasing any MRP II software.

1.2 Objectives of this Project

The reasons of initiate this project are:-

- MRP II has been a long time in the market, yet its failure story still a major problems. However, most literature report has blamed the failure caused by the end user. Therefore, this report hope to provide a fair judgment and evaluation on both parties and identify the causes which bring the MRP II **failure**.
- there is still a lack of a proper solution and theories which can really help the needs of different industries problems, requirements, etc. In others word, most research theories are not able to solve the real business environment.
- industry managers has difficulty to apply the theories in their own business **environment**. Most of the discussion on papers or academic knowledge are **too** general and is very hard for them to implement. Some is too complex, especially a lot of calculation which is very hard for a managers to understand and apply.
- Most academic researcher, computer profession has a lack of exposure to real business environment. As a result, quite a number of **software** installation are **fail** or most theories findings are not realistic. In other words, they do not know exactly the need of each industry requirements and its problems.
- Much of the solutions are discuss in an island method or specific area such as inventory management or financial costing, etc. which do not involve the whole **business** functions organization as a perspective. Thus, it still cause a lack of **integrity** among departments and could cause the major problems during the implementation of **MRP II** which required a great degree of **integration** and understanding among departments.

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49. Barry E. Blood, *Read My Lips - No More late Deliveries*, *Hospital Materiel Management Quarterly*, May 1994, 15 (4), pp. 53 - 55
50. Bem'ni, P.J., *Repetitive Versus Discrete Manufacturing: A Middle of the Road Approach*, 1981 Conference Proceedings, APICS, Chicago, 1981, pp. 44-46
51. Edwards, J.N., *MRP In A Mass Production Environment*, 1977 Conference Proceedings, APICS, Cleveland, 1977, pp. 321 - 324
52. Steiner, J. C., *Mass Production MRP Without Mass Producing Paperwork*, 1979 Conference Proceedings, APICS, St. Louis, 1979
53. Steiner, J. C., *Mass Production Shop Floor Controls Without Mass Producing Paperwork*, 1980 Conference Proceedings, APICS, 1980, pp. 369 - 371
54. Julian M. Levy, *MRP Implementation*, *The European Technical Conference Proceedings*, British Production And Inventory Control Society, 1985, pp. 175 - 179
55. Peter G. Burcher, *Master Production Scheduling*, *The European Technical Conference Proceedings*, British Production And Inventory Control Society, 1985, pp. 180 - 190
56. Szendrovits A. Z., and Truscott W.G., *Fundamentals of Scheduling: The Manufacturing Cycle Time*, in Wild, Ray, ed., *International Handbook of Production and Operations Management*, Cassell Education Ltd 1989, Chapter 18
57. B. Jones, *Managing Critical Resources*, *The European Technical Conference Proceedings*, British Production And Inventory Control Society, 1987, pp. 11 - 33
58. Richard Platford, *Financial Implications of Manufacturing Investment*, *The European Technical Conference Proceedings*, British Production And Inventory Control Society, 1987, pp. 32 - 41
59. Gary T. Carrington, *Defining Business System Requirements For The First-Time User*, APICS 1984 Conference Proceedings Readings in Computers and Software, 1984, pp. 41-43
60. Neville P. May, *The Functions Needed For Process-Oriented Systems*, APICS 1984 Conference Proceedings Readings in Computers and Software, 1984, pp. 29 - 32
61. Roderick Moulding, *Lot Traceability as a Time-Based Performance Management Tool*, APICS 1993 Conference Proceedings, 1993, pp. 337 - 340
62. Moulding, Roderick, *MRP and GMP*, *The European Technical Conference Proceedings*, BPICS, 1982, pp. 167 - 174
63. Martin, Francois C., *Planning Production Campaigns*, *Production and Inventory Management Journal*, 1989, Vol.30 No. 2, pp. 1-5
64. Steven F. Bolander & Sam G. Taylor, *Process Flow Scheduling: Calculations and Comparisons*, APICS 1993 Conference Proceedings, 1993, pp. 466 - 470
65. Hal Mather, *Production Activity Control*, ed., in Greene, James H., 2nd ed., APICS *Production and Inventory Handbook*, McGraw Hill, 1987, Chapter 16, pp. 16.1 - 16.57
66. Nathan Hollander and Naomi Mirlocca, *The Path To Successful MRP Package Selection*, APICS 1993 Conference Proceedings, 1993, pp. 614 - 615
67. Frank Scavo, *software Validation For Pharmaceutical and Medical Device Manufacturers*, APICS 1994 Conference Proceedings, 1994, pp. 676 - 681
68. Richard D 'Silva and Graeme Robinson, *Optimizing Finite Capacity Schedules*, APICS 1994 Conference Proceedings, 1994, pp. 28 - 31 Exhibitor
69. Beal, K., *A Management Guide To Logistics Engineering*, ed., *The Institution of Production Engineers*, London, 1989, Chapter 3, pp. 44 - 64